

CLAIMS

What is claimed is:

- 1    1. A method for provisioning bandwidth in a hybrid network, comprising:
  - 2                 assigning a set of switching wavelengths to traffic in the network;
  - 3         and
  - 4                 optically switching the traffic between nodes using the set of
  - 5         switching wavelengths.
  
- 1    2. The method of claim 1, further comprising:
  - 2                 identifying critical nodes in the network;
  - 3                 establishing at least one static path between the identified critical
  - 4         nodes; and
  - 5                 optically switching traffic on the static path using the set of
  - 6         switching wavelengths.
  
- 1    3. The method of claim 1, further comprising:
  - 2                 dynamically selecting a path for traffic flow;
  - 3                 signaling downstream nodes in the path to establish and maintain the
  - 4         selected path for a predetermined time period;
  - 5                 optically switching traffic on the selected path during the
  - 6         predetermined time period using the set of switching wavelengths; and
  - 7                 releasing the selected path after the predetermined time period
  - 8         elapses.

1    4.    The method of claim 1, further comprising:

2                 assigning a set of routing wavelengths to a portion of the traffic in  
3        the network; and

4                 routing the portion of traffic between nodes using the set of routing  
5        wavelengths.

1    5.    The method of claim 1, further comprising:

2                 statically assigning a set of switching wavelengths to traffic in the  
3        network; and

4                 optically switching the traffic between nodes using the set of  
5        switching wavelengths.

1    6.    The method of claim 1, further comprising:

2                 dynamically assigning a set of switching wavelengths to traffic in  
3        the network; and

4                 optically switching the traffic between nodes using the set of  
5        switching wavelengths.

1    7.    A method for sharing bandwidth in a hybrid network, comprising:

2                 labeling traffic to be switched in the network with a set of switching  
3        wavelengths;

4                 labeling traffic to be routed in the network with a set of routing  
5        wavelengths; and

6                 optically switching the traffic labeled with switching wavelengths;  
7        and

8                 routing the traffic labeled with routing wavelengths.

1    8.    The method of claim 7, further comprising:

2                 optically switching the traffic labeled with switching wavelengths  
3        using optical circuit switching; and

4                 routing the traffic labeled with routing wavelengths using Internet  
5        Protocol (IP) routing.

1    9.    The method of claim 8, further comprising:

2                 converting the traffic labeled with routing wavelengths from an  
3        optical domain to an electrical domain;

4                 processing the traffic labeled with routing wavelengths in the  
5        electrical domain; and

6                 converting the traffic labeled with routing wavelengths back to the  
7        optical domain from the electrical domain.

1    10.   The method of claim 7, further comprising:

2                 optically switching the traffic labeled with switching wavelengths  
3        using a wavelength network element, an optical cross-connect, an optical network  
4        element, an optical switch, a lambda switch, a lambda network element, or a  
5        wavelength translator.

1    11.   The method of claim 7, further comprising:

2                 routing the traffic labeled with routing wavelengths using Open  
3        Shortest Path First (OSPF), Resource Reservation Protocol (RSVP), or Border  
4        Gateway Protocol (BGP).

1    12.   The method of claim 7, further comprising:

2                 routing the traffic labeled with routing wavelengths using an Internet  
3        Protocol (IP), asynchronous transport mode (ATM), or frame relay.

1       13. The method of claim 7, further comprising:

2                 labeling traffic to signal and transfer control information updates in  
3       the network with a set of control wavelengths; and

4                 exchanging routing updates using the set of control wavelengths.

1       14. The method of claim 7, further comprising:

2                 labeling traffic to signal and transfer control information updates in  
3       the network with a set of control wavelengths;

4                 appending labeling information on routing updates;

5                 exchanging routing updates and labeling information using the set of  
6       control wavelengths; and

7                 generating a label map from the routing updates and labeling  
8       information.

1       15. An apparatus to communicate in a hybrid network, comprising:

2                 switching logic to optically switch traffic carried on a set of  
3       switching wavelengths;

4                 routing logic coupled to the switching logic to route traffic carried  
5       on a set of routing wavelengths; and

6                 control logic coupled between the switching logic and the routing  
7       means for receiving information carried on a set of control wavelengths to  
8       determine whether traffic is directed to the switching logic or the routing logic.

1       16. The apparatus of claim 15 wherein the switching logic is further to:  
2                   dynamically select a path for traffic flow;  
3                   signal downstream nodes in the path to establish and maintain the  
4 selected path for a predetermined time period;  
5                   optically switch traffic on the selected path during the predetermined  
6 time period using the set of switching wavelengths; and  
7                   release the selected path after the predetermined time period elapses.

1       17. The apparatus of claim 15 wherein the switching logic is further to:  
2                   assign a set of routing wavelengths to a portion of the traffic in the  
3 network; and  
4                   route the portion of traffic between nodes using the set of routing  
5 wavelengths.

1       18. The apparatus of claim 15 wherein the switching logic is further to:  
2                   statically assign a set of switching wavelengths to traffic in the  
3 network; and  
4                   optically switch the traffic between nodes using the set of switching  
5 wavelengths.

1       19. The apparatus of claim 15 wherein the switching logic is further to:  
2                   dynamically assign a set of switching wavelengths to traffic in the  
3 network; and  
4                   optically switch the traffic between nodes using the set of switching  
5 wavelengths.

1       20. A hybrid communication network, comprising:

2                     a first hybrid node to label switched traffic with a set of switching  
3                     wavelengths, to send the switched traffic to at least one secondary hybrid node via  
4                     the set of switching wavelengths, to label routed traffic with a set of routing  
5                     wavelengths, to send the routed traffic to at least one secondary hybrid node via  
6                     the set of routing wavelengths;

7                     at least one secondary hybrid node coupled to the first hybrid node  
8                     to receive the switched traffic on the set of switching wavelengths and routed  
9                     traffic on the set of routing wavelengths, to route the routed traffic using an  
10                  Internet Protocol (IP), asynchronous transport mode (ATM), or frame relay, and to  
11                  optically circuit switch the switched traffic and the routed traffic to another  
12                  secondary node.

1       21. The system of claim 20 wherein the first and secondary hybrid nodes  
2                  further comprise a wavelength network element, an optical cross-connect, an  
3                  optical network element, an optical switch, a lambda switch, a lambda network  
4                  element, or a wavelength translator.

1       22. The system of claim 20 wherein the first and secondary hybrid nodes each  
2                  further comprises logic to receive routing updates and label information via a set  
3                  of control wavelengths, to generate a label map from the routing updates and  
4                  labeling information, to generate a switching matrix using the label map.

1       23. The system of claim 20 wherein the first and secondary hybrid nodes each  
2                  further comprises logic to store routing.